INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN TECHNOLOGY EDUCATION PROGRAMMES IN NIGERIA: CHALLENGES AND THE WAY FORWARD

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ABSTRACT

Technology education, in this computer age, should aim at improving the quality of life of individuals. This makes information and communication technology in Technology education, indispensible; both in the classroom situation and in educational administration. The technological tools and resources that are used to communicate and to create, store and manage information; includes computers, the internet, radio and television. Communication technology assist learning environment by: Motivating students to learning, facilitating the acquisition of basic skills and enhancing teacher training and retention. This paper attempts to look at the various areas where information technology plays vital role in improving all segments in the education sector, particularly in Technology education; considering the facet of its involvement. For instance, the Tel net application of the internet enables a user to interactively access a remote computer; as in a global village. The paper concludes by giving areas that information and communication technology affects day to day lives. The paper also gave the following recommendations which are expected to offer solution to challenges that are experienced. Among them are provision of infrastructural support in power supply, internet facilities, training and deployment of skilled manpower to the various teacher education institutions. The teacher education curriculum should be restructured to accommodate ICT education in order to meet the new educational challenges. Teacher training institutions should design and deliver in-service and pre-service training for teachers.

INTRODUCTION

Information has always played a very important part in human life. However, in the mid-20th century, the role of information increased immeasurably as a result of social progress and the vigorous development in science and technology. Trostnikov (1970) opined that, rapid expansion of a mass of diversified information is occurring, which has received the name 'information explosion". As a result, the need has arisen for a scientific approach to information and for elucidation of its most characteristic properties which has led to two principal changes in integration of the concept of information. First, it was broadened to include information exchange of signals in the animal and plant worlds. The pace of change brought by new technologies has had a significant effect on the way people live, work, and play worldwide. New and emerging technologies challenge the traditional process of teaching and learning, and the way education is managed. Information and Communication Technology (ICT), which is an important area of study in its own right, is having a major impact across all curriculum areas particularly in Technology Education. Information and Communication Technology may be viewed in different ways. The World Bank (2006) defines ICT as "the set of activities which facilitate by electronic means the processing, transmission and display of information". ICT represent a cluster of associated technologies defined by their functional usage in information access and communication; of which one embodiment is the Internet. Suffice to use the definition of Information technology as enunciated in the Nigerian National Policy for Information Technology (FRN, 2001). Information technology is defined as "computers, auxiliary equipment, software and firmware, (hardware) and similar procedures, services (including support services) and to a related resources" (p. ix). It is also defined in the same document as "any equipment or interconnected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission or reception of data or information" (FRN 2001, p. ix). Thus, they can be regarded as the technologies used for accessing, processing, gathering, manipulating, and presenting or communicating information, these could include software, hardware, and even connectivity (Anderson & Baskin, 2002). ICT, represented by the Internet, deliver "at once a

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worldwide broadcasting capacity. a mechanism for information dissemination, a medium for interaction between individuals and a market place for goods and services (kiiski and Pohjole. 2000). As pointed out by Capron (2000), mails, telephone, TV and radio, books newspapers and periodicals are the traditional ways users send and receive information. However, data communications system-computer system that transmits data over communications lines such as telephone lines or cables have been evolving since the mid-1960s. One of the most dramatic advances in communication potential, data communications is found in the field of computer technology. Since the first development of the modern electronic digital computers in the 1940s, computerization has infiltrated almost every area of society in nations with advanced technology. Computers are available in man formats for use in industries, businesses, hospitals, schools, universities, transport networks and individual homes. Small or large, a computer network exists to provide computer users with the means of communicating and transferring information electronically. The use of Internet has revolutionized access to information for the business world, libraries, education and individuals. A few of the most popular include E-mail (electronic mail), World Wide Web (www), FTP (File Transfer Protocol), Usenet, and Telnet. It is the objective of this seminar paper to examine the challenges and the way forward in Information and Communication Technology in Technology Education in Nigeria. Attempt is made to trace the development of ICT especially telecommunications system in Nigeria and the growing popularity of ICT devices in both the educational and economic development of Nigeria as a whole.

INFORMATION AND COMMUNICATION TECHNOLOGY POLICIES AND THE NIGERIAN EDUCATION SYSTEM

The studies of computer in Nigeria's educational system started in the late 70's and early 80's, though, there was no policy for its inclusion into system until 1988 (Federal Republic of Nigeria, FRN, (1988). The 1988 document contained information on the application of computer at various levels of the country's education, and with issues related to basic objectives, hardware and software requirements. The document also comments on teacher training, specifically, for the secondary school level. The implementation of the policy was kick started with a training programme conducted for 197 teachers from across the country Yusuf, M.O. (2007). In addition, computer systems were introduced into the federal unity schools and armed forces secondary schools. However, the initial enthusiasm gave way and little was achieved about the set objectives, particularly in Technology Education. The initial problem was difficulty jin placing the ICT in the school curriculum structure. While some believe it is with Mathematics some see it as a structure that must be embedded among the vocational subject. Further challenges for ICT integration in the Nigerian schools system came with the 2001 National Policy on Information Technology, tagged "Use ICT". It was a major step in the integration of ICT in all facets of the country's life. The document, among others, recommended a start up grant of at least $15m and two percent allocation from the total national budget for articulating the vision of the document. The Nigerian National Policy on ICT FRN, (2001) has within its scope the vision, mission, general objectives and strategies for the implementation of the policy. The document, in the areas of education, among others, envisaged the development of ICT curricula for all levels of Nigerian education, the facilities, and ICT dedicated institutions. What is mission is the direct reference to Technology Education in the planning and execution of the programme.

The revised National Policy on Education FRN, (2004) emphasized the need for ICT at all level of Nigerian education, for Instance, the document in Section 11 sub-section 102 stated that: (a) "All states, Teachers Resource Centers, University Institutes of Education, and other professional bodies shall belong to the network of information and Communication Technology (ICT)" (p. 53). Another major aspect of the document that is ICT related is the national virtual library project aimed at the rejuvenation of the Nigerian schools through provision of easy access to current books, journals, and other information resources using digital technology FRN, (2004). It must be emphasized, however, that little or no efforts have been made to implement the ideas set out in these 2001 and 2004 documents.

Another major policy document on ICT use in education is the Ministerial Initiative on Education for the Nigerian Education System, Federal Ministry of Education, FME, (2004) the document contains information on the theoretical framework for e-education in Nigeria, analysis of the Nigerian situation, that is factors inhibiting or promoting the integration of ICT in education, components of e-education in Nigeria, e-education blue prints, elements of the blue print strategies, decade goals (2015), mid-decade goals (2009) and the action plan, among others. The ministerial initiative document though not encompassing enough to address ICT integration in Nigerian schools, contained policy statements, which could leapfrog the integration of ICT in Nigerian schools. Recently, the new secondary education curriculum now place Computer studies/ICT as a core subject which every student must offer along four other core subjects NERDC, (2008).

HOW ICT CHANGES ROLES OF TEACHERS AND STUDENTS

The use of ICT has brought about a change in the roles of both the students and teachers. The teacher is no longer the dominant figure in teaching learning process and the gap between teaching and learning is now narrower and more imprecise. These are some of the realities as a result of ICT in education:

- Teachers will no longer be masters but colleagues
- They are no longer custodians of knowledge and culture but guides and helpers.
- They help manage learning not "give rules" on how to learn
- The interactive nature of internet and the www allows teachers and students to share knowledge and ideas. Thus, teachers and students become partners and learn from each other.

STUDENTS' ROLES CHANGED WITH ICT

- Students will operate mostly independently
- They will no longer be passive recipients of knowledge, but active participants in what and how they learn.

BENEFITS OF ICT TO TEACHERS

- ICT as a **medium for facilitating and managing learning:**
  - ➢ Easy accessibility to course materials by learners
  - ➢ Share course materials with colleagues
  - ➢ Ease of update
  - ➢ Communicate with learners outside the classroom
  - ➢ Manage individual target setting
  - ➢ Test learners' understanding
  - ➢ Track learners' progress
- ICT as a **preparation and presentation tool:**
  - ➢ Prepare schemes of work
  - ➢ Research and access teaching materials
  - ➢ Create teaching materials
  - ➢ Present information in front of the class (as part of face – to face sessions)
- ICT as a **learning tool:**
  - ➢ Provide one-to-one attention
  - ➢ Develop understanding
  - ➢ Deliver differentiated lessons
  - ➢ Convenience – Learning at ones pace, time and place

CHANGES TO THE USE OF ICT (e-learning)

There are several changes to the successful use of ICT (e-learning) in teacher training institutions and others. These include among others: development time, cost, weak infrastructure, lack of skills and access to Internet.

- ➢ **Development Time:** It takes considerable amount of time and expertise to develop a good e-learning package.
- ➢ **Development cost-Initial cost of assembling expert:** course contents experts, computer programmers, instruction design experts and graphics artists are quite expensive.
- ➢ **Cost:** the cost of purchasing equipments (ICT components) e.g. Computers and Vsat is high. Of course, provision of internet facilities in teachers training institutions is like a mirage and so limited institutions or individuals have access to the net.
- ➢ **Weak Infrastructure:** In Nigeria a formidable obstacle to ICT (e-learning) is infrastructure deficiencies. The country is seriously deficient in reliable electricity supply which is a necessity for the e-learning process.
- ➢ **Lack of Skills:** The country is not only deficient in ICT infrastructure but also lack human skills and knowledge that are prerequisite to the success and realization of the e-learning dream. Nigeria needs personnel to install, maintain and support these systems.
- ➢ **Is E-learning Replacing Teachers?** There is growing fear of e-learning replacing teachers. This is not true because e-learning is meant to compliment teachers and make them more efficient and goals realizing. It is interesting to know that not all courses are delivered well by computer. Some

training topics such as group projects, team work and any activities that involve emotions requirement human interaction. E-learning will not replace the classroom, but it has the potentials to change the purpose and function of the classroom considerably.

> **Bandwidth and Limited Access to the Internet:** Inability of users (individuals, private, and government) to make use of large bandwidths makes the process of accessing and working with the net cumbersome. Limited bandwidths make downloading and other activist to be slow and discouraging. Also in Nigeria there are few internet providers that provide gateway services to the populace. The greatest technological challenge in Nigeria is how to establish reliable cost effective Internet connectivity. The internet providers are charging so high a fee and this probably to enable them recover the huge cost of investment. This of course will be difficult for training institution to meet up.

ICT, TEACHER EDUCATION AND SUSTAINABLE DEVELOPMENT

Education, according to National Policy on Education, is the most important instrument of change; any fundamental change in the intellectual and social outlook of any society has to be preceded by an educational revolution (FRN, 2004). In his view, Obaji (2006) stated that no nation striving for accelerated development does so without first developing its educational system; by developing its own crop of professionals, technologists and scientists, on whose shoulders rest the articulation and implementation of collective vision of the nation or social-economic and political development. Thus, one clear fact about education is that it is a springboard to national development, that is, through education human resources are developed to meet manpower needs for nation building. Also, Todaro and Smith (2003) posited that education is the primary agent of transforming a society towards sustainable development and increasing people capacities to transform their vision for society into reality. In line with the above views Obaji further pointed out that education for 'sustainable development' is a process of learning that has 'futuristic' benefits in building the capacity of the citizens for a meaningful engagement of the forces that shape socio-economic development. From Obaji's definition, the following phrases could be itemized;

- Process of learning
- Futuristic benefits
- Building human capital
- Shaping socio-economic development

That is by summary, the level of socio-economic development of a nation is a function of the level of human capital development which is attainable through quality education or instruction (process of learning). According to NPE (2004), the quality of instruction or education at all levels has to be oriented towards attaining the nation's socio-economic development. As such teacher education (tertiary education) being one of the levels of education in the nation has this duty to perform. In short, according to the policy, teacher education shall contribute to national development through high level relevant manpower training.

CHALLENGES OF ICT IN TECHNOLOGY EDUCATION

Technology Education in Nigeria comprises of Technical Drawing, Auto Mechanics' Technology. Electronics Technology, Metalwork Technology, Woodwork Technology, Building Technology and other related trade that makes the recipient to be independent of labour market. Technology Education involves children in problem-solving processes perceived as central to the development of their capability to do quality work. The world, outside the school system has been able to achieve much in the area of ICT integration in their daily routine. The digital divide between Africa and the developed world is well established in literature. Nigeria rants 15th, even in Africa in Internet host at 1998 Hall, (1998), and deprivation in ICT use persists in Nigeria when compared with global standard FME, (2004). Globally, ICT implementation in Technology education has not been smooth sailing. By 2008, Africa had early eight times as many Internet users as it did in 2000. Compared to other regions, growth in Africa was the third-highest, after the CIS and the Arab States. The increase was led by Nigeria, which alone added 10.9 million new Internet users (Information Society Statistical Profiles, 2009) between 200 and 2008, 38 percent of the total additions in Africa in that period. Though, there is an over-reliance on textbooks and only occasional demonstrations and experimental classes. In an average classroom, one finds a teacher at the blackboard jotting down important facts, students furiously copying all that is written and said, expecting to memorize the facts and spit them out on an examination.

According to World Bank, (2006), the majority of teachers in African, Latin American, and poor countries generally not only lack adequate hardware and software, but also reliable Internet access. These are

significant barriers to using computers in instruction, government, and business. With the increased momentum of technologies revolution sweeping across the world, there is the need for teaching and learning of Technology Education in Nigeria to change such that the computer is brought into the classroom. Researchers have been concerned about the barriers that have militated against effective integration of ICT in Technology Education in Nigeria. Organisations in Africa have been concerned with the problem of poor implementation of ICT in African school. For instances, the Association of African University (AAU, 2000) examined the problem and major obstacles affecting the use of ICT in African Universities, and thus defined the problems to be technical, non-technical, human and organizational and financial. Technical obstacles identified include the poor telecommunication infrastructure, absence of national information communication infrastructure lack of university coherent plan for ICT, problems of connectivity, lack of or limited bandwidth for ICT for learning, teaching, and research, non-reliability of public electricity supply, thus necessitating extra cost for standby generators. The non-technical deals with lack of professional development for faculty, human and organizational aspect relates to inadequate planning for ICT integration in regular activities of universities, and inadequate human resource base, while financial relates to inadequate funding of ICT infrastructure, maintenance of available facilities, and staff development.

Research findings on challenges to ICT application in other levels of education have provided similar results. Some of the findings of these studies are enumerated as follow. First is the lack of teacher's confidence and teacher's computer anxiety BECTA, (2004). Second lack of teacher's competency due to lack of time for training, lack of pedagogical training, lack of skills training, and lack of ICT focus in initial teacher training (Yusuf 2005). Third, there is lack of access to resources due to lack of hardware, poor organisation of resources, poor quality hardware, inappropriate software, and lack of personal access for teachers. Fourth, is lack of time to use ICT as a result of school time table BECTA (2004). Fifth, there are technical problems which encompass lack of technical support, fear of things going wrong, lack of telecommunication and other infrastructure, and unreliability of electricity BECTA, (2004).

Others include lack of or ineffective technological leadership in schools, lack of clear vision, lack of incentives for teachers, lack of teachers' participation in planning for ICT integration Spodark, (2003). Since these barriers are known it is important to device strategies that will provide enabling environment for ICT use in technology Education in Nigerian Schools. Other challenges include the following among others:

Limited ICT facilities: Limited fund available to higher institutions have hindered the provision of needed facilities and infrastructure to promote ICT usage. Most faculties of education and schools of education in Nigeria do not have dedicated laboratory for ICT training. Classrooms are equally not equipped for ICT usage. Thus, teacher trainers and trainee teachers do not have access to ICT within their schools. The few available ones are used mostly for administrative purposes.

Inadequate course content for ICT: The curriculum for teacher education is centralized based on NUC, NBTE or NCCE minimum academic standard. The content that strategies are based on single course model. It is meant to teach trainee about the computer, not teaching them how to learn or teach through the computer. While this is good for introductory stage its outcomes are very limited. They cannot furnish trainee with the needed skills and knowledge to integrate ICT in their instruction.

Lack of clear direction on teacher training on ICTs in the Nigerian National Policy for Information Technology (NNPIT): The national policy on information technology (FRN, 2001), is supposed to give clear directions for successful use of ICT in schools. The policy only made superficial reference to education at the mission, goals, and strategy levels. There is no sectorial reference to Technology Education. Education is subsumed under human resource development. Since no clear information or reference is made to Technology Education development the document does not give focus to Technology Education in the implementation of ICT in Nigeria.

Inadequate Skilled Manpower

Inadequate ICT technical personnel are major problem in Nigeria tertiary education. The reason for this can be ascribed to the lucrative job opportunities available to ICT professionals outside the academics. The situation has made institutions rely on commercial private ventures to provide support for the few ICT facilities available. The support offered is in most cases are commercial and lack academic content. As a way out of this challenge, some universities like Federal University of Technology, Minna, Bells University of Technology, University of Nigeria and Namdi Azikuwe University are in partnership with private organizations like AFRIHUB for ICT technical manpower development.

FUNDING

This is the major challenge confronting the acquisition and utilization of ICT Technology Education in Nigeria tertiary education. Most institutions solely rely on their proprietor for funding and the bulk of such fund goes to servicing the overhead cost.

Lack of leadership by professional organisation: In advance countries professional organisations like International Society for Technology in Education (ISTE), Association for the Advancement of computer in Education, Milken Exchange on Education Technology, play pivotal roles in promoting ICT integration in schools and also in setting standards for Technology Education. However, professional organisations like Computer Association of Nigeria (CAN), National Association for Educational Media and Technology (NAEMT), computer professionals, and so on, have not impacted on the use of ICT in schools, the promotion of ICT in Technology Education, or in setting academics or professional standards on ICT. This lack of leadership creates vacuum with militates against quality ICT component of Technology Education in Nigeria.

Problem of Electricity: ICT equipment is electrical equipment that requires electricity for operation. Most rural areas of Nigeria do not have electricity facility and in urban area, electricity supply is not stable, and this reduces the life span of hardware and also militates against effective usage. Even enthusiastic Technology Educators and students who have access to computers may be debarred from using them as a result of power outage.

RESISTANCE TO CHANGE

There is the concern of Technology Educators not willing to take the "soft" approach to teaching and learning. Rather, they stick to the traditional hard "approach". This "This is how we have been doing it approach among some instructors".

Lack of technically experienced lecturers: Most of the lecturers in Nigerian universities, colleges of education, and polytechnics do not have competence in the use or integration of ICT in their instruction. Majority of lecturers who had taken tenured job were taught without ICT and they have not developed competence in the use of ICT, thus they cannot model good use f technology (Idowu, Adagunodo & Popoola, 2003). Even in the USA, faculty lecturers have been shown not to be better than their students in ICT usage (Moursund & Bielefeld 1999). Information and Communication Technology is an essential tools in any educational system. They have the potentials of being used to meet the learning need of individual, students, promote equality of educational opportunities; offer higher quality learning materials, increase self-efficacy and independence of learning among students, and improve Technology Education professional development.

The application of ICT offers multiple learning pathways and widespread access to Technology Education, breaking down barriers to learning and teaching connected to distance and location, so Technology Educators can easily have opportunities to update and upgrade their knowledge and skills.

THE WAY FORWARD:

Infrastructure-Sharing: Given the need for investment in ICT infrastructure in Nigeria, it is logical to minimize duplication and share facilities, where practicable. This can reduce costs and prices, making ICT more affordable for a wider segment of the population. Regulators can help by creating a trusting environment among operators and developing policies that promote infrastructure-sharing.

TAXES

Taxes on communication services strongly influence ICT use for Technology Education in Nigeria, given the low average income levels in the country. Import duties on ICT equipment, VAT on goods and services and excise taxes on communications services raise prices, limiting take up and discouraging use. VAT on communication services range from 5 to 23 percent across the African continent (*Information Society Statistical Profiles 2009*).

LEARNERS TRAINING:

While many different terms have been used to describe what students need, such as digital literacy, technological literacy, and 21st century skills, education leaders, nationally and internationally, are beginning to come together around a new common definition of what students need to know, Information and Communication Technology Literacy. ICT Literacy reflects the need fro students to develop learning skills that enable them to think critically, analyze information, communicate, collaborate, and problem-solve, and the essential role that ICT plays in realizing these learning skills in today's knowledge-based society.

Representative of the ICT literacy skills are the following six arenas critical to students' success in the workplace (Kay and Honey, 2005).

Communicate Effectively: Students must have a range of skills to express themselves not only through paper and pencil, but also audio, video, animation, design software as well as a host of new environments (e-mail, Web sites, message boards, blogs, streaming media, etc).

Analyze and Interpret Data: Students must have the ability to crnch, compare, and choose among the glut of data now available Web-based and other electronic formats.

Understand Computational Modeling: Students must possess an understanding of the power, limitations, and underlying assumptions of various data representation systems, such as computational models and simulations, which are increasingly driving a wide-range of disciplines.

Manage and Prioritize Tasks: Students must be able to manage the multi-tasking, selection and prioritizing across technology applications that allow them to move fluidly among teams, assignments and communities of practice.

Engage in Problem Solving: Students must have an understanding of how to apply what they know and can do to new situations.

Ensure Security and Safety: Students must know and use strategies to acknowledge, identify, and negotiate 21st century risks.

PROFESSIONAL DEVELOPMENT:

After the educational goals and vision of learning through ICT have been determined, it is important to provide professional development to teachers to help them choose the most appropriate technologies and instructional strategies to meet their goals. Students cannot be expected to benefit from ICT if their teachers are neither familiar nor comfortable with it. Teachers need to be supported in their efforts to use ICT. Teachers must be offered training in using computers. Teachers cannot be expected to learn how to use ICT in their teaching after a one-time workshop. Teachers need in-depth, sustained assistance not only in the use of the ICT but in their efforts to integrate the technology into the curriculum.

EDUCATIONAL GOALS AND A VISION OF LEANING THROUGH ICT:

Before ICT technology is purchased, the educational goals for students should be determined. What do students need to learn, and how can ICT promote those learning goals? To answer these questions, the school can convene a technology planning team comprising administrators, teachers, other instructional staff, technology coordinators, students, parents, and representatives of the community. This team first develops a clear set of goals, expectations, and criteria for student learning based on national and state standards, the students population, and community concerns. Next, it determines the types of technology that will best support efforts to meet those goals. The viewpoints of parents and community members are helpful in presenting a broader perspective of skills that students need to succeed after school.

TECHNICAL INFRASTRUCTURE AND SUPPORT:

Increased use of ICT for Technology Education in Nigeria requires a robust technical infrastructure and adequate technical support. If teachers are working with a technology infrastructure that realistically cannot support the work they are trying to do, they will become frustrated. Governments have a responsibility to create not only nominal access to computers and electronic networks but access that is robust enough to support the kinds of use that can make a real difference in the classroom. Teachers also must have access to onsite technical support personnel who are responsible for troubleshooting and assistance after the ICT technology is in place.

Other efforts by the government should involve the following among others:

- Governments should provide higher education with tax incentives in the acquisition of hardware and software for educational purposes. These will encourage universities to increase ICTs access for Internet usage,
- Government in collaboration with ICT vendors such as internet Service Providers (ISPs) and Telecommunication companies should also have special bandwidth access rates for higher education.
- Universities should lobby and advocate for Internet support from both government and ICT vendors. Developing new generations of e-learning systems, improving infrastructure for ICT software research and development.

CONCLUSION

The use of ICT as a force to drive Technology Education in Nigeria is a major undertaking, but it is an investment in the future productivity of the Nigerian workforce and the future prosperity of the country. Thus policies, norms and guidelines will have to be established to promote the use of ICT in Technology Education in Nigeria. In this paper 1 have proposed a framework of ICT policy for Technology Education and if adopted and properly implemented, the country will benefit from the proceeds for many years to come.

The success of the implementation will require a major commitment of resources and the supports from many stakeholders in the public and private sectors fo the government. It also requires the total and sincere support of all agencies in the Technology Education system. Moreover sufficient funds are needed to establish and maintain ICT in the schools. Also, continuing professional development for teachers, school heads and other educational personnel must be instituted.

RECOMMENDATIONS

- ICT education should be included in teacher education curricula in the various teachers training institutions with qualitative programmes that will address ICT knowhow.
- Provision of necessary infrastructural support: power supply, internet facilities and others. Also, massive training and deployment of skilled manpower to the various teacher education institutions should be encouraged.
- Teachers should be encouraged to attend ICT workshops and conferences in order to expose them to the content of ICT in education. Particularly, teachers should be exposed to training in simple software development in order to introduce them to building of courseware.
- Teacher education curriculum should be reformed or re-structured to accommodate ICT education in order to meet the new educational challenges.
- Adequate funding by relevant bodies; Government, international donors etc should be provided for the entire educational sector, particularly, teacher training institutions with emphasis on ICT development.
- Teacher training institutions should design and deliver in-service and pre-service training programmes for teachers.

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